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## Elementary proofs of Fermat, Goldbach and everything else

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Every professional researcher in number theory and many mathematicians not related to number theory are contacted, and sadly sometimes harassed, by authors that have found alleged elementary proofs of Fermat Last Theorem, the Goldbach conjecture, the twin prime conjecture and other problems with a simple statement that almost any pedestrian can understand. There are some common patterns:

1. **Individual treatment.** This is the point that, in my experience, is more strange. Unlike other areas, to publish in top mathematical journals is free and open to everybody and I know exceptional persons that have published research in mathematics without any university affiliation. Curiously the authors of these alleged proofs of big results stubbornly insist on avoiding this process and they address to a professor. This can only delay the “urgent” publication (see below).
2. **Secrecy and suspicions.** Many authors refrain from saying plainly what they got, they insist on scheduling an appointment or on talking on the phone about something important. Very often they do not want to give any detail about the proof and they only communicate it when they feel in a comfortable situation.
3. **Urgency.** The alleged proof is so important that you have to devote all your time to read it and to enforce its publication. Not devoting some hours or days to understand the details is a personal offense to the author and a mortal sin against Science.
4. **Confidence.** The authors have not the slightest doubt about their work even if they have delivered many versions correcting previous errors. Always the last revision is final. For the meager minority that tries the publication by the usual means, demolishing reports or direct rejections does affect their faith.

**The proofs.** If we restrict ourselves to the proofs that make sense, the rule is that they are hard to read, irrespective of the length. There are not indications about the general lines and there is not a good introduction. It seems that the authors consider that an elementary proof is more rigorous if it is obfuscated. When they are translated to a simpler mathematical language, in my experience they have been a chain of insubstantial manipulations until a big mistake is made.

Very seldom there is a reasonable bibliography or any hint revealing an effort to get information about the research on the topic. Nevertheless with the aforementioned confidence one finds claims about the novelty of the ideas. It is curious the impression about genius that many people develops: Nobody would think that a pedestrian could win a match to the first player of the ATP but it seems that some consider plausible to defeat the chess world champion by chance or to solve, again by chance, a mathematical problem unsettled during centuries. They consider that the ideas come on the spot and training is for the people that sweat.

**The mistakes.** In general there are two kinds of errors, about logic and about divisibility. The former are more common in people with less education and they can involve to confuse necessary and sufficient conditions, ignore what a proof is or even to appeal to non mathematical concepts. The divisibility errors can be very subtle.

The most of the authors do not admit the error once it is pointed out or only do it after long and tiring discussions. In the case of logical errors they are difficult to convince because there is not a common language.

Once an error is admitted there is a golden rule, in a couple of days they will offer you a new version repairing the *detail*. It is important to emphasize this word because, as I wrote before, a common pattern in the proofs is a series of obscure manipulations and a crucial mistake. For the authors, the manipulations are the kernel of the proof and the mistake a minor detail that can be repaired effortlessly. Unfortunately at this stage the situation can degenerate. Some authors do not understand that a professor did not want to receive endlessly versions of a work that considers flawed and they suspect that there is an attempt of stealing or hiding it.

**My advice.** I do not consider nonsensical the quest of elementary proofs in these problems and any researcher in number theory would like that somebody, professional or amateur, could find them. On the other hand, many people have thought about it without any success and then it is very likely that an apparently extra-simple proof contains an error, especially when coming from an amateur. My first advice for the authors, in particular for those without scientific education, is to be critical with their own work. Secondly, they should write the proof in a reader friendly way, respecting the etiquette, this includes to describe the main ideas, to give references and to use a reasonable notation. Finally, once an author is completely sure about the proof and the style has been carefully polished, one should submit it for publication without any mediator. The negative reports and direct rejections constitute a red flag not to be overlooked.

For people preferring the open publication on the internet there are the repositories arXiv, which imposes some requirements, and viXra, which does not require anything. In the latter they are posted a lot of proofs in the same vein as those considered in this document. An interesting exercise for the authors that insist on forcing a professor to read their proofs is to read before some of the proofs in viXra about the same topic. If they do not find a mistake they should think that they were late or wonder if it is fair to ask other person to do the same task that they refused to do.